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ABSTRACT

This paper proposes a learner-centered educational system, focusing on aspects that are intrinsically associated with the modern educational system, such as the curriculum, school community, parents, learners, and educational support personnel. It examines: primary level preparation (literacy, numeracy, and basic knowledge; examination and accountability; and complementary skills that enhance learning and character building, such as listening, study, memory, thinking, time management, multicultural, and social skills); high school level preparation, including preconceptual tests, the teacher and continuity, teacher training and subject specialization, sciences as separate disciplines in high school, integration of disciplines, learning as a sequential development, class size and subject rotation, textbooks, scientific literacy, mind tools, quality and quantity of information, the learning environment, and assessment; tertiary studies, which are designed to make teachers competent in using the medium of instruction and maximizing the knowledge of students in the chosen discipline; the teacher within the ideal curriculum (even in a learner centered classroom, education revolves around the teacher); the supervisor's role in learning; the parent-student relationship; brain development; the importance of good nutrition and a healthy lifestyle; positive attitudes; and the liaison with parents and the community. (Contains 36 references.) (SM)

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A Learner Centred Education

Florence N. Ballard

ED 471 560

A state 'invests' in thousands of students every year with the expectation that the outcome would be beneficial, not only for the individuals, but also for the community and the nation. 'Global' is the present norm and thus the expectation goes beyond the boundaries of a nation, culture, tradition and convention. An investment in good hands will bring out a high quality outcome, paying out high dividends to the nation and world community.

The rapid and diverse advancement in information technology and the easy access to the Internet, television, video, DVD players and other pastimes bring study to the bottom of a student's priority list. The students of today are so used to getting what they want in a fraction of a second as effective visuals on the television or interactive displays. As a result, the best effort of an efficient teacher may seem quite drab and uninteresting. A common problem frequently faced by a teacher in the modern learning environment is the students' short attention span. This alone demands a radical change in the existing teaching strategies and necessitates the application of a wide range of skills and approaches. This also calls for the inclusion of advanced technologies, which will create and foster a learning environment for the sustained development of interest, while offering unlimited challenges to a learner. A competent teacher would effectively manipulate these technologies and offer varied learning situations and keep the student active and engaged. Thus, the teaching strategies of the twenty first century will be incorporating the various technological advances in communication.

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The technological advances in communication will be exploited in this proposed ideal educational system of the future. Learning process would be mainly visual to captivate the attention of the students, who are conditioned to modern visual communication tools such as television and computer. Learning will be based on activities, constantly associating the findings with the relevant real world situations. The teaching will be enriched with metaphors, similes, analogies, models and demonstrations for deep understanding. The students will interact with visual and interactive displays and maximise their perception. Computers, video projectors and televisions will be the main tools of communication and the learning process will be global via interactive presentations. The Internet will be the learning arena, where the students open doors to the past, present and future and exploit all the resources at hand. The teacher will serve as a catalyst and a facilitator.

Nunley (2002) in her paper describes an experiment in which her subjects were given both auditory and visual stimuli simultaneously. The MEG scan showed electrical activity in both the regions. The brain was receiving information from both eyes and ears, but did not process the auditory information at all; only the visual stimulus was processed. She concludes that the brain showed a preference for visual information. Is visual learning more appropriate for the future? Virtual Learning would be ideal, since the eye-catching visual aids from a variety of electronic media will capture the attention of a learner and offer a variety of learning experiences. Cells alive, dissections of animals, physics web with the dazzling light rays that reflect, refract and disperse and the like on the Internet offer amusement that lead to better understanding. Observations, hands on activities, visual diagrams that reveal patterns and interrelationships, graphics that interpret what a student has internalised, concept maps that reveal what a student has conceptualised, the missing links and the misconceptions and pictures showing how facts and ideas fit together are a few of the visual stimuli that will be effectively infused into the curriculum.

While elaborating the characteristics of this learner centred curriculum, I endeavour to draw attention to what could be done in order to bring an educational system closer to an ideal system in the future. Observation of educational practices in four different countries, familiarity with five different curricula and a wide research on international education form the basis for these recommendations. The educational set up may slightly differ from place to place in different parts of the world, but the educational goals are invariably the same. These recommendations are feasible and intended for achieving high outcomes in all the disciplines from primary to high school through to tertiary institutions.

Since an educational system consists of individuals, with their own unique differences in their individuality, the decisions undertaken to enhance the system should be humane, positive and rational and it should promote and nurture self-confidence in teachers and learners. This is absolutely necessary to bring out the best in a teacher and learner. It is a partnership where both should be made to feel that they are engaged in a worthwhile process that deserves all the support and encouragement of all those who are involved. Both the teacher and the learner should have the freedom to accomplish what they want, bearing in mind that every thing revolves around the learner and the only goal is to help each learner to be a winner in the end. Any interference adversely affecting this process would result in huge losses on the predicted outcomes.

This paper deals with the various aspects that are intrinsically associated with the modern educational system such as the curriculum, school community, parents, learners and educational support personnel, since all of them are actively engaged, directly or indirectly and work as a cohesive force in their effort to bring out the best in students.

The preparation at primary level

Literacy, Numeracy and Basic Knowledge

In a learner centred curriculum, acquiring the operational command of the language, i.e. the medium of instruction, is the main target at primary level. The students, who arrive at high school with poor literacy and numeracy skills, fail to achieve a satisfactory outcome due to learning difficulties in their chosen disciplines. This deficiency affects their level of participation in class activities and their ability to construct knowledge further. Poor readers have difficulty in comprehension and expression and this hinders their progress in their academic work. Effective measures have to be taken to eliminate this problem at an early stage, while the students are at primary school.

Attaining the essential basic knowledge in the various disciplines needs to be given equal importance at primary level. This is critical because the primary studies lay the foundation for further construction in their key learning areas and offer continuity in learning at a higher level. The fundamental knowledge of the various disciplines will be clearly outlined in the primary curriculum. These basic concepts may not be reintroduced beyond the primary level due to time constraints. Hence, the students need to retain the key concepts in memory. The learning experiences at high school will be the extension of what they learn at primary level. For example, if the students were to come to high school with the basic knowledge of the structure and function of the parts of a plant, the teacher could readily facilitate further construction of the complex life processes and lead them to higher order thinking levels. Similarly, if the students arrive with the basic knowledge of atoms and molecules and are aware that these are used in their daily lives as compounds, the teacher can easily extend it further by explaining the bonding of atoms and formation of compounds. Activities at primary level should be fun, but should lead to the understanding and inculcation of basic facts/concepts that form the basis for their future studies.

This learner centred curriculum will lay greater emphasis on drill and practice at primary level, though some might consider this as old fashioned. Those who have learnt the multiplication table with a rhythm or the poem, 'Thirty days have September ...' know how difficult it is to get rid of them from memory. According to Harish (1997), the repeated exposure to a stimulus or the rehearsal of a piece of information transfers it into long-term memory. This is what we need for our students, the appropriate strategies to enhance their learning and achievement levels.

The teachers, who are competent in a certain discipline and have a passion for teaching this subject, will be asked to teach the same subject across the various levels. The students will get ample opportunities to use their visual, tactile, audio and kinaesthetic senses. Learning methods will be flexible and the students will be encouraged to use a variety of tools/methods to obtain information. The use of computers and technology, researching through the reading materials available in the classroom/library, experimenting, discussions and visiting the school garden to examine flowers, fruits, seeds and organisms could be a few of the activities during a session. Is there a child in this world, who would not be fascinated by the green, spiral chloroplast in a spirogyra filament or the blood flow in a frog's web or the scales of a butterfly when viewed under the microscope? Such activities during childhood will arouse the young students' interest and curiosity and will remove the misconception that certain subjects are uninteresting.

Periodic informal testing, assessments and projects will be effectively infused into the curriculum at primary level. Testing and effective feed back will keep a student well informed of the requirements of the study and guide him/her to achieve better by choosing the appropriate study methods. It might also help to concentrate on the essential facts that are crucial for retention. Such an insight becomes a learning tool at higher levels.

The students' achievement levels and other personal details relevant to the study will be recorded throughout their study at primary school and forwarded to the next institution, where the student intends to take further study. A common examination is recommended at the end of the primary level, which will be content specific and would aim to test the understanding (not rote learning) of the essential basic concepts that are retained in memory and bring out the misconceptions.

Examination and Accountability

An effective way to eliminate poor literacy at a higher level would be the introduction of an external examination, a modified version of the International English Language Testing System to suit the junior level, which the students will undertake, when they are about to complete their primary studies. The examination will be in three modules designed to test the student's listening, reading and writing abilities. The results will be recorded separately for each module. It will also have two additional modules to test the basic numeracy skills and fundamental knowledge in the disciplines taught. Such a stringent measure will not allow the students to undertake further study before they are ready for it. If the nation were to be in the lead in scientific research and advancement, we have to adopt what is best for our future citizens. Testing will be under examination conditions and will require external examiners. The money spent in administering the examination will be worthwhile in the long run. In order to simplify the administration process, the testing of the students' English speaking skills could be made a part of the school program. A student, who does not achieve well enough to meet the requirements, receives learning support till he/she completes the examination successfully and then moves on to high school. It is better that these students stay back and gain sufficient skills than come poorly equipped to high school. This scheme will ensure high outcomes for these students eventually. This will also eliminate behaviour problems in learning environments at higher levels to a large extent.

Complementary Skills that Enhance Learning and Character Building

The students will be taught the essential skills that would enhance their learning such as listening, study, memory, thinking, time management, multicultural and social skills at primary level, when they are young and impressionable. Inculcation of such skills would enhance their achievements in their learning areas and assist in moulding their character. The students, who lack such assistance and guidance at home, would benefit immensely by the introduction of these skills at school. 'Teach them young, if it were to last a lifetime' will be the guiding principle. An ideal learner centred education will bring out the best in students and shape them to be men and women of sound character, productive professionals and worthy citizens.

> "...it is important to hire employees that have strong ability to think or cognitive skills, are accurate in their work, have an agreeable nature and who are conscientious. By doing this in this kind of situation you are more likely to have a fully functioning and productive team." (HR Zone, Guide to Human Resources, 2002)

Listening Skills

Poor listening skills of a student in a learning environment could affect his/her learning adversely; hence the student has to be taught to improve his/her listening skills. The teacher cannot transfer information as a tangible substance to the listener. The listening process must be stimulated in the receiver. For the cycle of communication to be complete, there should be active participation by the receiver. Tomatis (1987) theorized that the listening skills are a major factor in cognitive development, learning and personality development, and play a central role in everyone's learning, social, cognitive and motor development. Sacarin (1999) supported Tomatis' view and she concludes:

> 'To be capable, successful and fulfilled in life at every age we depend on good listening and well-controlled body movement skills from very early throughout our lives'.

Study Skills

The study skills are subject-specific and teaching study skills ensures deep understanding and long term retention. Deep understanding enables a student to see the big picture clearer than the students with superficial understanding. Grotzer (1996, Project Zero, p7) clearly states that the teacher should teach for deeper understanding, use strategies to help students transfer understandings, seek out the most generative topics for in-depth exploration and teach 'finding out' skills to help students throughout their lives. This is critical, if the students were to apply what they have learnt beyond the context of school.

Memory Skills

Learning basic memory skills will not only assist students in their daily routine, but also boost their brainpower and quality of life. This is not rote learning, but remembering the essential facts needed for further construction of knowledge and to interpret meaningfully. There is no learning without memory and no one can be creative, unless they recall information from their memory to apply to new situations. According to Lorayne (1990), there are three fundamental learning skills; locating the information needed, remembering the information located and understanding and organizing the information located. A learner, if equipped with these skills, applies his past experiences to new situations effectively. Hence the activities should aim at establishing such skills in young children.

Time Management Skills

Time management is an integral part of the study skills, which needs to be taught at an early stage. Often, the students at higher levels fail to complete tasks or tests in class and fail to submit assignments, as they do not know how to manage the allotted time. Teaching time management skills will enable the students to plan and use their time productively, while at school and later in their future career.

Thinking Skills

Teaching students how to think productively is very important. Thinking skills are best taught linking with the curriculum. The skills developed in memory are complementary to the skills of creative thinking. The students associate with what they remember. The more they remember the greater will be the extent of the cognitive network. This has proved to be an effective strategy in learning and a prerequisite to attaining higher order thinking levels. An effective learning environment will initiate and sustain higher order thinking, problem solving and metacognition in students.

> "... knowledgeable thinkers have a better chance of taking charge of their lives and achieving personal advancement and fulfilment ... students must be prepared to exercise critical judgement and creative thinking to gather, evaluate, and use information for effective problem solving and decision-making in their jobs, in their professions and in their lives" (Swartz & Parks, 1994, p3).

Multicultural Skills

Teaching of multicultural skills should play an important role at primary level. If we expect the students to be high achievers at higher levels and have good cross-race, cross-culture, and cross-gender relationships, the schools should be non-discriminatory, and be fair to all students, irrespective of their race, culture, gender and ability. This makes the deliberate segregation of the gifted and low achievers in a learning environment debatable. The curriculum should include an appreciation of diversity at school level, if the students of diverse backgrounds were to function well in a culturally diverse community, nation and world. By the time a student enters high school, he/she should have established appropriate patterns of interaction that are based on mutual respect and a fair mind to appreciate others, irrespective of their gender culture and race.

Social Skills

Teaching the students the various social skills is equally important. The skills such as the ability to work harmoniously with others as a team, evaluate and make decisions before accepting responsibilities, use different methods to resolve conflicts and employ leadership skills are to be developed at an early age. The students would benefit, if good communication skills were taught for better interaction with peers and to develop positive attitudes and relationships.

Summary

Thus the preparation at the primary level would aim at establishing sound literacy and numeracy skills, providing concrete foundation for all the disciplines for further construction of knowledge at higher levels, establishing the functional skills that would achieve high outcomes and a sound character and civic consciousness for good citizenship. Sports and games play a vital role at this early stage, though it is not within the scope of this paper.

High School Level

Preconceptual Tests

In an ideal system, preconceptual tests would still be administered, even though the students arrive at high school with recorded data from the primary school. These tests are reliable indicators to show whether the students would be able to correlate between what was learnt at primary level and the topics that will be dealt with at high school. However, the students will be given assistance to recall their past learning on the essential fundamental concepts outlined in the primary curriculum before they take up complex concepts at high school. The high school curriculum will be precise and flexible. The evolution of the primary curriculum into the respective senior curriculum is crucial for the continuity of the study.

Primary and High School Working as One Unit

It would be ideal to have both the feeder primary and the high school of a particular town/suburb on the same premises. This would make it easier for the primary and high school teachers to interact with each other regularly. Such proximity would enable them to organise students' learning experiences in a sequential manner in the increasing level of complexity from the primary to the secondary level and monitor the students' progress effectively. In the absence of the above set up, the schools should involve the teachers of the primary feeder schools and the respective high school teachers of the concerned discipline to make the transition from primary to high school a smooth process. Both the schools would be working together as a unit in supporting their students. The teachers will meet and discuss matters relating to the teaching of the various disciplines frequently, mainly relating to the topics/syllabus covered at primary level, problems encountered and ways of improving the adopted teaching strategies based on students' aptitude, attitude and performance. The two groups of teachers will continue to work together and establish an effective network by communicating with each other, either meeting in person and/or via electronic mail. Teamwork of this kind will certainly amalgamate the junior and senior teaching and learning and will ensure gradual development of the study and as a result, better achievements could be envisaged.

Work Programme

In this learner centred educational system, every teacher will plan his/her own work programme as per schedule. A teacher may assist others in planning, but will not plan for another teacher. Each teacher is unique and should have the freedom to implement his/her own teaching strategy. The work programme will clearly show how much the teacher intends to complete within a month, term, year and thus accountable.

Every teacher will endeavour to accomplish as per schedule, but if there is a complex concept that demands more time, the teacher will have the autonomy to extend the study and make sure that all the students have grasped the concept, test their comprehension and then proceed to the next topic. Thus, the teacher has the liberty to determine what is best for the students under his/her care. The teacher will make up by saving time while dealing with the simple concepts and try to complete what has been allocated for a year.

The Teacher and Continuity

Despite the efforts, if the teacher fails to complete what has been allocated, the teacher will carry it over to the following year and make sure that all the topics outlined in the curriculum are completed. Hence, this system prefers a teacher working with the same batch of students throughout their study of a particular subject at high school. Omission of a concept as a whole or in parts affects the further study of the topic at a higher level. This could be the major cause for low achievement at higher levels and drop out at tertiary levels. Keeping a teacher happy in the same school for many years is a challenge to the school authorities, but it is worthwhile.

Teacher Training and Subject Specialisation

The university study and training in many countries prepare a teacher to handle two subjects at high school level. Thus, a teacher is essentially equipped to teach either biology and chemistry or perhaps, physics and maths. The teacher is certainly not qualified to teach all the sciences plus another subject at high school level. If the teacher has to handle more than one subject, the teacher has to be offered the two subjects in which he/she is specialised. This cannot be a matter of convenience, where an unspecialised teacher fills in a vacancy and keeps the students occupied. If we were to get excellence in education, only a subject specialist should teach a key learning area.

Sciences as Separate Disciplines at High school

The general science at the primary level will become more specific at high school. The three disciplines will be segregated and taught as physics, chemistry and biology by subject specialists. It is vital that only the teacher, who has had a thorough university study and relevant training, teaches the key learning areas. If the teacher were to lead a student to higher order thinking levels, the concept must be presented as a whole. Only a teacher with a vast knowledge in the subject area and deep understanding of the concept can integrate the various disciplines to present the whole picture effectively. A trained teacher of biology may not handle chemistry as effectively as a trained teacher of chemistry and vice versa.

Table 1. Recommended Allocation for Sciences

	Session	Session	Session	Session	Session
Day 1	English	Maths	History	Art	Art
Day 2	English	Maths	Geography	Drama	Drama
Day 3	English	Maths	Economics	Health & Phy.Ed	Health & Phy.Ed
Day 4	Physics	Chemistry	Biology	Information.Tech.	Information.Tech.
Day 5	Physics	Chemistry	Biology	Elective	Elective

The recommended subject allocation (shown above) will give sufficient time and opportunities to deal with the different subjects effectively; also will give a significant boost to science teaching. In this learner centred educational system, this will be the recommended allocation for high school studies until the students complete their secondary level.

Integration of Disciplines

We need to understand the concept of integrating the various disciplines from a different perspective. For example, a biology specialist can effectively link biology and physics and assist the students to comprehend the movement of bones in the human body based on the working of simple machines. While dealing with photosynthesis, the same teacher could relate the process to chemical reactions and extend the study further by linking the concept of polymerisation in chemistry and explain how a polysaccharide is formed from simple sugars. The teacher can establish links readily with history to explain the evolution of man or with geography and geology, while dealing with fossils and so on. Though the teacher is a biologist, he/she knows how to integrate biology with the other disciplines because the teacher has spent many years specialising in the subject, amassing considerable amount of knowledge.

Learning – A Sequential Development

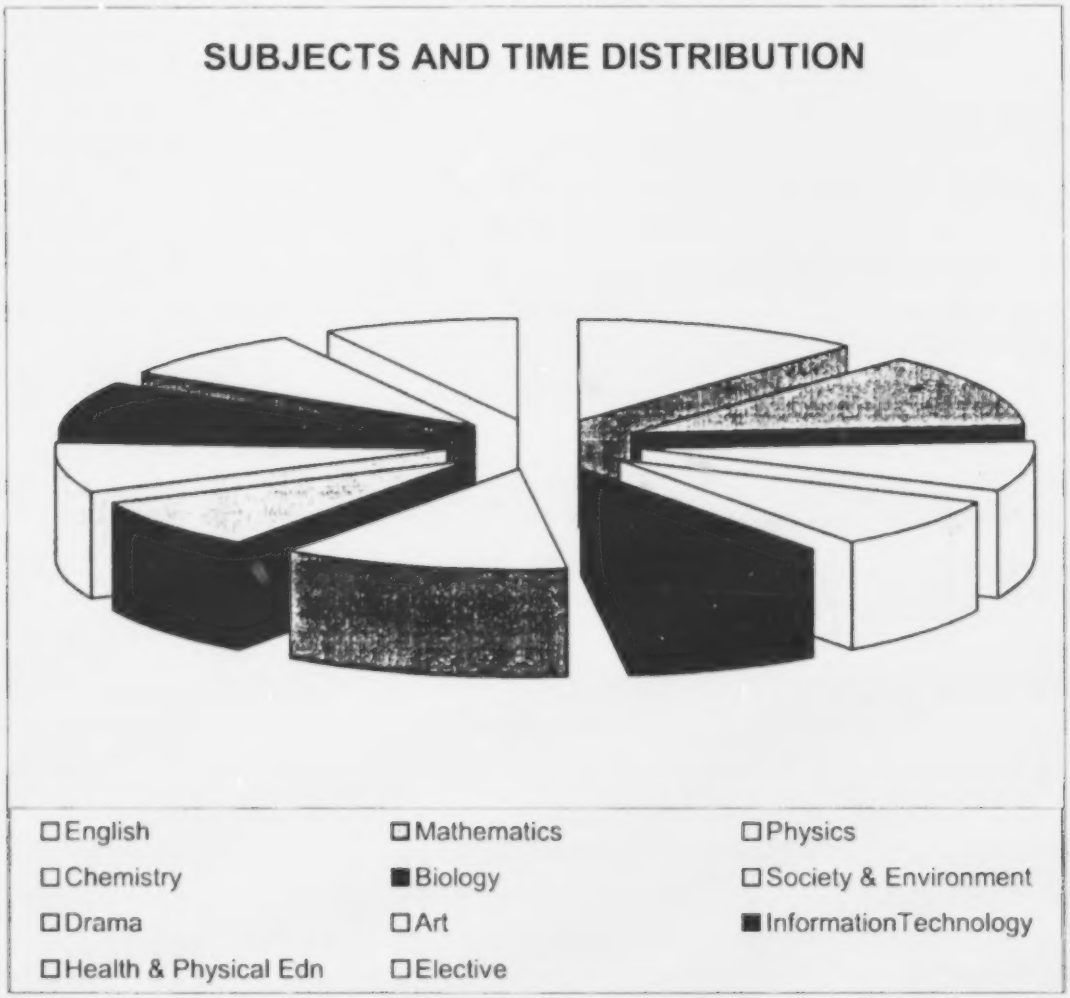
Let me present an example to show how a particular discipline could be developed over a period of ten years. When a group of science students are in their second year at primary, they sow seeds, watch germination and observe how a seedling transforms itself into a plant. They get to know what a seed is, how it germinates, grows and reproduces. When they move up to the third year, they learn more about what the roots, stems, leaves and flowers do for the plant. They reach the next higher level and learn that roots have special devices such as root hairs to absorb water or perhaps, the leaves need to have the green chlorophyll to prepare food and so on. The teachers develop the topic gradually, adding knowledge until they reach their tenth year. By this time, the students would have acquired sufficient knowledge and skills to demonstrate that a plant is essentially a living organism, not only capable of looking after itself, but also can propagate successfully to avoid extinction.

If the same student chooses biology in years eleven and twelve, further knowledge is acquired and this prepares the learner to go as an apprentice in a commercial nursery/ farm or to the university to become a botanist or do a related study. Either way, we have presented the discipline, botany here, as a whole and prepared the learner for a better outcome, even if the student turns out to be a gardener in his own backyard. On the other hand, if we fail to include a part of plant physiology, such as the factors that affect photosynthesis in year eight or transpiration in year nine due to time constraints, then we have lost the continuum. This will affect the understanding of the learner adversely and the 'entirety' is lost; this disables construction of knowledge at a higher level. Similarly, a learner, who has never learnt anything about the atoms, symbol or chemical formulae, will face serious problems, if he is sitting in year ten, trying to balance a chemical equation. The lack of basic knowledge to complete the task at this stage could create an aversion for the subject and nothing could be done at this level to arouse enthusiasm in a learner. This could be happening to many students, who missed out on basic knowledge at lower levels. Learning should be developed sequentially from simple to complex concepts, from primary level to secondary level based on constructivist principles. An ideal system will have no compartmentalised time frame and no pressure to complete vast portions within a limited time to facilitate reporting, where the students' understanding will be questionable.

Students' Attention Span and the Duration of Teaching Sessions

Considering the students' short attention span, the length of the teaching sessions should be optimum, if we were to enhance students' concentration and comprehension and eliminate behaviour problems. A session could have a duration of forty to fifty minutes. A well planned session could offer a variety of learning environments within this time and could capture the attention of learners more effectively. Long sessions may work well for adults and small groups, but may not be ideal for a class of thirty adolescent students.

The following graph shows the possibility of accommodating the different subjects at high school level and the time distribution:



English and Maths have been given more learning time. This is justified because proficiency in English would enable a student to perform well in higher studies and in future career. Moreover, there are students in every class, who require more time to grasp mathematical concepts. The study of Society and Environment is given equal importance because, in reality, it integrates more than three subjects.

Table 2. Subjects and Time distribution

SUBJECT	NUMBER OF SESSIONS (50 minutes each)	DURATION (MINUTES)	PERCENTAGE %
1. English	3	150	12
2. Mathematics	3	150	12
3. Physics	2	100	8
4. Chemistry	2	100	8
5. Biology	2	100	8
6. History [1]	1	50	4
7. Geography [2]	1	50	4
8. Economics [3]	1	50	4
9. Drama	2	100	8
10. Art	2	100	8
11. Information Technology	2	100	8
12. Health & Physical Education	2	100	8
13.Elective [4] – (Home Economics/ Music/ Tourism/ / Second Language/ Graphics/ Technology)	2	100	8

[1, 2, 3] These are the components of the study of Society and Environment and the overall time would be three sessions of fifty minutes. The subjects are separated out so that the subject specialists could handle the sessions separately.

[4] This is the elective. This could be any one of the subjects given in the table or a subject that is more appropriate, depending on the need of the community where the school is functioning.

Class Size and Subject Rotation

The class size is another factor that will require restructuring and this should be realistic and feasible. An ideal science class would have about fifteen students. This will enable a teacher to cater to the needs of individual students. This will also ensure positive behaviour and a favourable learning environment. A class of 30 could be divided into two groups of fifteen (Group 1 & 2) and the respective subject specialists will teach the three science subjects in rotation. Thus, the students will learn in small groups under the guidance of the subject specialist ensuring a high quality teaching and learning. Other disciplines, which aspire to function effectively, will trial similar arrangements.

The following tables give the operational method of subject rotation:

Table 3. Group 1 – Subject Rotation for Term 1 (about 6 weeks)

Week	Session 1- Key Learning area	Session 2 - Key Learning area
1	Physics	Chemistry
2	Biology	Physics
3	Chemistry	Biology
4	Physics	Chemistry
5	Biology	Physics
6	Chemistry	Biology

Table 4. Group 2 – Subject Rotation for Term 1 (about 6 weeks)

Week	Session 1-Key Learning area	Session 2-Key Learning area
1	Chemistry	Biology
2	Physics	Chemistry
3	Biology	Physics
4	Chemistry	Biology
5	Physics	Chemistry
6	Biology	Physics

Personal Resources - Textbooks

The schools will ensure that the students have a textbook, appropriate to the level of study, containing all the topics included for the year level. The books will have plenty of resources and the information will be presented in an appealing manner, with many pictures as visual stimuli, relating to real life situations and relevant to the context. Individual ownership of the book will enable further reading and follow up after each lesson. This will also help the students to complete their homework. A textbook offers further assistance to a student in extending what has been developed in class, as he/she may not be able to remember all that had been discussed during a session. Repeated reading of the topic reinforces the concept, consequently facilitates deep understanding. This is obligatory, if the students were to reach higher order thinking levels.

Scientific Literacy

I read the following passage recently and it seems relevant here.

> "...All of a sudden vocabulary isn't a frightening thing", he (Nellan, the teacher) said of his method, adding that many people use word roots in teaching vocabulary. "One of the beauties is, they aren't just memorizing; they are learning how language works, and also how to look things up." (The New York Times, March 18, 1992)

A student centred curriculum will lay great emphasis on scientific literacy. The reason being, most of the resources in science use technical terms and one cannot escape the use of scientific terms at higher levels of study. Unless the student is familiar with the terms to a certain extent, he/she may not be keen to scan through the resources and gather information. Introduction of technical/scientific terms will be relevant to the topic and gradual. Loading the students with many new terms at a time will be completely avoided. Importance will be given to correct spelling and pronunciation of technical/scientific terms.

In order to make the use of technical terms easier, the students will be introduced to the commonality of certain terms of Greek/Latin origin, generally with the same prefix. In principle, this is etymology, a study of the origins of words and how they evolved. This is not as daunting as it sounds; it will help the students to identify relationships between words and make the study more meaningful. There will be deliberate and repeated references to these terms, as frequently as possible, until the majority of the students use these terms appropriately and comfortably. The students generally acquire the skill of deriving the meaning of new terms based on their past experiences very quickly. For example, if the teacher were to teach about hypodermic vaccination and emphasised that the prefix, 'hypo' generally means 'below/under/lower', whenever the teacher uses similar compound words such as 'hypothermia', 'hypotonic' or 'hypoglycemia' later in the study, the student readily associates the new word with the past learning experience and generally arrives at the correct meaning inductively. Moreover, such mental exercises help in better retention of facts, make the study more challenging and interesting. This also saves time in explaining similar new terms and tunes the student's brain for accelerated learning. In this learner centred curriculum, every opportunity would be utilised to make the students realise their long-term goals. The students will be encouraged to remember and use scientific terms, but will not be forced to memorise the term or the meaning. Such efforts enable a student to perform better at higher levels.

Mind Tools

Teaching mind tools such as mnemonics, offers challenges to a student, activating the brain for better retention. Such tools would form the basis for remembering key terms/concepts. Concept maps, Roman room system, Association, symbolism and Story links are a few mind tools that would benefit the learner and facilitate retention.

For example, a set of students in a class created the mnemonics, 'Actor Tyson Came Galloping', in order to remember the names of the four bases in DNA and the base pairing rule. (Adenine, Thymine, Cytosine and Guanine; Pairing: Adenine & Thymine and Cytosine & Guanine). These students had great fun in creating the mnemonics, testing the memory of their peers and recalling the facts, when they were tested. The students should be encouraged and appreciated when they attempt to use such tools for better retention.

Subject Specialist as the Subject Expert

In a student centred school, the authorities would be keen to exploit the abilities of a specialist. Only a subject specialist can manipulate the information and keep a learning environment active with sustained interest in the students. Needless to say, such a situation demands that a teacher masters his/her own area of specialisation and has a thorough knowledge of the discipline. The teacher should be able to answer the questions posed by the students in the key learning area readily, thus satisfying the students' thirst for knowledge. A teacher should constantly update her knowledge in his/her discipline. It is also vital that the teacher attends the relevant professional development courses to improve his/her teaching strategies. In the best interest of the learners, an unqualified teacher will not be allowed to handle a key learning area in a learner centred institution.

Quality and Quantity of Information

Student achievement also depends on the quantity and quality of the information given to them. A teacher should be sensitive and should instinctively know what his/her students would and wouldn't grasp. For example, when the students are just out of primary school, and are learning about vitamins, it is appropriate to start with 'B - Bran – Beri-Beri', 'C – Citrus - Scurvy' and 'D - Morning/Evening Sun - Bones' and 'A Carrot for Eyes' and relate them to real life situations, where references could be made to deficiency diseases.

Such an approach will motivate the students and enable higher retention because the information is within their grasp. It may not bring forth the desired results, if the students are loaded with complex names of the vitamins such as Pantothenic acid, Pyridoxine and Cyanacobalamin. Introduction of such terms would induce an aversion towards the subject, since these terms might go well above their heads. They could be led further on vitamins, when they go to a higher level, giving their complex names, their function/s deficiency diseases and the foods that contain these vitamins; the study could even be extended by giving more complex details such as the molecular structure of a vitamin.

A viable Learning Environment

It would be ideal, if the teacher were assigned a classroom to conduct his/her classes or at least two teachers to share adjoining rooms with facilities to conduct practical and theory sessions. The teacher will have the freedom to access equipments and chemicals for use, while at school. The laboratory attendant will assist the teacher, whenever help is required. The allocation of classrooms and the timetable would be in such a way that the students will be able to use interactive media such as computers during their learning sessions. There will be at least one (working) computer for every 3 students, and connected to the Internet. The classroom will have loads of resources on the particular learning area. The teacher will introduce a topic, give students challenging activities and guide them to make use of all the available resources. While the students engage in learning, the teacher will move around and facilitate knowledge acquisition. Those who complete their work will have the choice of assisting others (peer support) or moving on to extensions or taking the next higher step as we see in the Layered Curriculum. This could well be a full-fledged outcome based education functionally, where the students complete the required level successfully and move on to the next higher level. In a learner centred education, team teaching will be encouraged where a student gets the best of more than one teacher.

Assessment

This paper does not deal with the characteristics of a good assessment, but emphasises that an assessment should achieve what it intends to achieve. The teacher will design the assessment projects with utmost care so that the students will utilise all the available resources creatively and put the work together in the classroom. Sufficient time will be given so that the students would be able to obtain their parents' assistance to plan their work at home, i.e. if they wish to include their parents in their accomplishment, but only the student's ability, which is demonstrated in the classroom, will be assessed for authenticity.

Importance of Individual Performance

The marks/grades obtained in tests, assessments and group work will be assigned different values. Teamwork is excellent in learning interpersonal skills, but the end result may not show the individual merits. Similarly, in most cases, students receive help from their parents and peers to complete assignments and hence, their work cannot be counted as individual attempts. If equal merit is given to all the three appraisals, it will mask an individual's understanding and intellectual abilities. This could easily lead a low achiever into a lull and he/she may not feel the need to put in any effort into studies. Credit should be given to group activities, but the merit given to individual performances should outweigh the credit given to group performances, while granting student achievement levels. If we were to get academic excellence, individual talents and achievements should be acknowledged and nurtured.

Importance of Periodic Testing

In an ideal system, every concept will be developed systematically from the basics to its highest complexity in a gradual manner without omitting any part of it. The students will be tested/assessed at least twice a month to verify their knowledge, conceptual links, higher order thinking skills and misconceptions. Tests will not be elaborate but will serve the purpose. Testing will be a part of the learning process and at the discretion of the teacher concerned. The grades obtained will be recorded and an effective feedback will be given to students. The information obtained from these tests will be used to improve teaching strategies and for planning remedial work. Deep understanding of the topic alone would enable a student to manipulate the information to novel situations, thus attaining the ability to achieve higher order thinking levels. Knowledge and memory are crucial for metacognition. Consistent effort alone will achieve these goals.

A Common External Examination

An external examination is recommended at the end of year 10. This is aimed at testing the students' knowledge and application skills in their chosen disciplines, which would form the basis for their secondary study or vocational training. The school will have provisions to support those who do not meet the required standard, till they are ready to take the test again. A common external examination result will reveal a student's capabilities and make it easy for a vocational trainer to decide on the right vocation for the student. This makes it possible for the trainer to cater for individual needs and decide on the appropriate the training strategies. Further, it makes it easy for a student with an academic certificate to continue further study anywhere in the country. A common examination ensures accountability on the part of a learner and the teachers and makes high school study far more challenging and directed with a goal to achieve in the end.

I have a comparison here. National athletes go through rigorous training, till they are ready to compete. They are tested and retested and may even face exclusion from the Olympics, if not competent enough or until they reach the level of expectation. Many athletes realise that this is a serious challenge and work with determination to reach the required standard. They are aware of this expectation and know that it can't be otherwise. This gives them the determination to push ahead and win. Thus, we have established certain norms for every sportsman and woman. We make sure that they are fit before they compete in an international event, though the event lasts just for a few days. In the same way, a norm has to be set in the education of our children, since we are training them to be life long winners. Every student should be made to realise the consequences of negligence, while at school, the importance of consistent work and the advantages of being a winner.

Secondary Level

The secondary students will specialise in their elective subjects by extending their knowledge in this learner centred education. The teaching strategies will be similar to what has been recommended for high school students, but there will be greater emphasis on preparation for a university or vocational study. They will be guided to participate in vocational programmes, skills training, environmental and community activities, research and competitions that promote civic consciousness and appreciation of their natural heritage. Much importance will be given to attending international summits and workshops that will lead to better international and cross cultural understanding. They will participate in international youth exchange programmes and widen their perspectives. The students will be taught to be responsible for their own learning and the consequences. They will be encouraged to make their own decisions with regard to learning and their future.

Summary

Only a qualified subject teacher will be allowed to teach a key learning area. The general science at primary level will be segregated into Physics, Chemistry and Biology at the high school level. To promote excellence in science, all the activities planned and executed will aim at achieving the students' deep understanding and higher order thinking levels. The concepts would be developed sequentially showing an increasing level of complexity. Completion of the syllabus and term reporting would not be a mechanical process, where there is no consensus to accommodate a thorough learning of the recommended syllabus. It will be ensured that all the information planned for the primary and high school levels are given to students without any compromise. The deficiencies in this matter would be rectified and effective measures will be put in place.

Tertiary Education

Tertiary studies will aim at making a teacher competent in using the medium of instruction and maximizing the knowledge of a student in the chosen discipline. These two factors are crucial, if they were to take up teaching after completing their degrees. The universities will have to restructure the system, if the students who graduate do not have ample knowledge in their chosen discipline. The tertiary students' acquired knowledge and application skills have to be examined periodically in an effective manner. The marks/grades should be distributed in such a way that there is enough credit given to knowledge, scientific processing and research. In reality, many graduates complete their degree with a certain amount of knowledge and understanding and gain more as a result of their work experience and this makes them experts in the subject, provided the occupation is related to their qualified subject.

If a tertiary student graduates without sufficient knowledge and chooses to be a teacher, it will affect the students' performance adversely and this should not happen. An ideal teacher will have a thorough knowledge of the discipline, be competent in using the medium of instruction and articulate in using scientific/technical terms. He/she would be able to integrate his/her own subject with the other disciplines, whenever a situation demands. There has to be a fair system to check the teacher-applicant's knowledge and skills before granting a teaching position.

The university students, who undertake graduate studies in education in order to become primary teachers, should be given the choice of getting specialised to teach key learning areas. They will choose to teach science, art subjects, languages, health and physical education or others, according to their aptitudes and interests. They would require a thorough study of the fundamental concepts in the disciplines chosen. They would be competent in their chosen areas and would possess adequate knowledge to teach the basics at primary level. They would train the students in such a way that the students would effectively adapt to high school subjects after the completion of primary studies. A primary teacher trained to teach science would teach only science and a physical education teacher, only physical education and so on, as we had discussed earlier and this ensures excellence in education.

Only a subject expert would guide and supervise the trainee during teacher education. And would guide the trainee in acquiring a thorough knowledge of the chosen discipline, teaching skills and direct the trainee to adopt different teaching strategies. Similarly, when the trainee practises teaching, a subject expert of the same discipline will further guide him/her. The trainee would be given ample freedom to experiment all that he/she had learnt in theory at the university without adversely affecting the outcomes of the students.

In effect, a university would train a teacher to be competent and mould him/her to be a constructivist, so that all the activities planned and executed by the teacher will be in the interest of the learner.

A teacher will be a/an:

- facilitator of learning and a guide,
- teacher whose lessons are driven by reality and up-to-date information resources,
- information manager, building collaborative teams, and
- knowledge navigator, celebrating and developing patterns for life-long learning,

Teacher in an Ideal Curriculum:

The entire realm of education revolves around the teacher, even though it is learner centred. The teacher plays a pivotal role in any curriculum. The teacher serves as a guardian, guide, counsellor, friend and facilitator, while the students are at school and undoubtedly, exerts a tremendous influence on their lives outside the school. The teacher needs to be consistent, fair and firm in the disciplinary measures meted out to the students and by all means non-discriminatory. In an ideal system, the teacher will have genuine concern for the students. The teacher will start every day with an aspiration that the day would bring out the best in all the learners under his/her care. The teacher will exercise self control at all times, irrespective of the severity of the situation. The teacher will be supportive, clearly voicing the right and wrong of all the activities concerning the behaviour of the learner. A teacher should have high aspirations and should be able to visualise the future of every student under his/her care. This should be realistic, based on the student's aptitude in the chosen discipline. Every student would be told about his/her aptitude and capability tactfully and discreetly. This awareness will be reinforced and appropriately guided by the teacher through out the study. Such a vision alone will enable a teacher to lead the student in the right path to success.

Ideally, the teacher will have full operational command of the medium of instruction and endeavour to avoid spelling and grammatical errors while writing on the board or in the scripts distributed to students. The teacher would always use appropriate terminology. Using substitute terms like 'thing' or 'this and that' would be avoided. A teacher cannot expect from his/her students what he/she cannot deliver in a learning environment. An ideal teacher would develop the habit of appreciating the 'richness' of the language explicitly so that the students would pick up the 'vibes' and imitate the teacher. The student would be always encouraged to use correct English, irrespective of the discipline taught. Spelling and grammatical errors will be noted and corrected in both the verbal and written tasks. The emphasis will be on the students' knowledge of the subject matter, the agility to express himself /herself using appropriate language in application.

Every teacher will refrain from causing harm, mentally or physically to the young people entrusted to his/her care. A teacher, who lacks such moral principles, will be directed to give up teaching and look at other options. This educational system will encourage teachers to interact with other educators on a global scale and create opportunities, where teachers move to the other parts of the world and learn how the other countries and cultures educate their children, thus enhancing their knowledge on curricular, co-curricular and extra curricular activities, effective teaching strategies and behaviour management,

The Supervisors

A supervisor's role is like a facilitator, bringing out the best in a teacher, consequently in the learners.

"Being a part of a team ... involves a special conceptualisation of the roles and responsibilities of both the leader and each team member. For leaders, teamwork means acting more like a facilitator than a superior (Rodd 1994, p91)".

Every teacher faces conflicting situations in a school at times, irrespective of how effective they are in their profession and amazingly, every teacher has his/her own way of dealing with different students at different situations. Therefore, a teacher should be given ample freedom to act in the interest of the student within the norms established by the institution, without being intimidated. Unless requested or posed with a serious threat, the supervisor need not interfere with the functioning of a teacher. In an ideal system, the supervisor would be a quiet observer, alert and ready to assist, but would never use the authority adversely.

Every teacher is under scrutiny all the time. At least sixty keen eyes watch the teacher every session and thirty minds assess and evaluate the teacher on every word, expression and appearance. This evaluation is discussed with peers, parents and others. This is further analysed with their contribution and conclusions are reached. This is repeated day after day and after every session. This may not cause concern in a few brave teachers, but the majority of teachers, whether they accept it or not, are anxious that every day should go well without any 'incidents'. This being the case, a teacher could do very well, if he/she wins all the support needed to handle these thirty different personalities with thirty different temperaments, all of them to be dealt with at the same time and in the same place. This is an extremely serious issue, though obscured. The employer or the supervisor needs to be sensitive, supportive and show understanding and concern in the every day activities of a teacher and this is crucial. The success of innovative and effective methods depends largely on how much freedom a teacher gets in implementing it. A traumatized teacher's mental state will affect his/her teaching immensely and this could cause much damage to learning situations. This could bring down the level of achievement in students. Effective measures should be put in place to curb such malpractices in learning environments, since this has tremendous power to destroy all the good work put in to improve education.

Other Factors

Amendments should be made in the state legislation so that only a subject specialist will be permitted to teach the key learning area. If the subject specialist is not available, alternative arrangements should be made so that teachers from other schools or local universities could assist in teaching the subject.

Just as a learner is required to be free from stress in order to achieve, the teachers should also be completely free from any kind of tension in the work place, if they are to assist the learner to achieve excellence in the outcomes. Transfers and work place issues should be dealt with sympathetically so that no one is offended in the process. Importance would be given to the preparation of appropriate textbooks for the different levels and the books should be made available for purchase at the beginning of the academic year. Purchasing textbooks would be the responsibility of the parents. Low-income parents could be given assistance to purchase books. Possession of a book would enable them to get direct information on the topics dealt with in class and this will help them to achieve better results.

Parents and Learners

Taking care of the young is a natural, basic instinct in all the higher and a few of the lower organisms in the animal kingdom. When we, the highest evolved of all, give priority to our natural instinct, educating and nurturing a child will be fascinating and rewarding. It should be heart-warming to parents to witness every milestone in the life of their child, which is effectively an achievement, whether it is taking the first step to walk or receiving an honour at the university. Every physical movement of a child leads to the development of a muscle, tendon or ligament and every mental exercise of the child augments the development of the brain. This is truly a miracle of life, indeed.

Epstein (2000) emphasises that a child needs the following in the first three years of life, if he/she were to achieve full brain potential in their young and adult life:

"A child needs to feel safe

All children need to know that they are special

A child needs to feel confident about what to expect from their environment

A child needs discipline

A child needs a balanced experience of freedom and limits

A child needs to be exposed to a diverse environment filled with books, music, and appropriate toys".

Dr. Epstein also suggests that touching, holding, rocking, talking, listening and reading, or just playing with a child dramatically influences the youngster's brain development. The way the parents interact with their young children and the experiences they provide them have a big impact on their youngster's emotional development, learning skills, and how they function later in life. This clearly indicates that the parents have to be sacrificial at times and make time to be with their children.

Brain Development

Today's parents should be aware that the embryo's brain development takes place even before their child is born. A baby's brain cells multiply at an astonishing rate before birth and it is important that the mother supports and nourishes the embryo with the right kind of food that enhances brain development. The mother should avoid undue stress, malnutrition, both legal and illegal drugs, cigarette smoking and alcohol consumption. It is equally important that the parents are willing to do all that they can to develop their children's potentials from the time they are born. The most rapid brain growth occurs during the first year of life, with the infant's brain tripling in size by the first birthday (Sears 2000).

Sears (2000), indicates that sixty percent of the brain is fat. The type of fat present in the mother's milk is the one that is utilised for the development of brain. Human milk is low in body building saturated fats and rich in brain-building fats, such as Docosa Hexaenoic Acid (DHA), an omega 3- fatty acid. It is ideal that the baby is breast fed during the early years for the optimal development of the brain.

Brain foods

Even though the brain has completed most of its growth by adolescence, it still continues to make vital connections during learning, hence a healthy diet is important.

> "There is a relationship between what children eat and how they think, act, and learn. Like every other system in the body, the brain needs good food. ...the better you feed the brain, the better it works" (Sears 2000).

Proper nourishment and good care help the children to develop into healthy individuals. A high fat meal diminishes mental alertness by diverting blood from the brain to the stomach to help with digestion. A good example of a healthy lunch would be a chicken/tuna on whole wheat bread, tomato, mayonnaise (low fat) made with canola oil, a side salad with plenty of greens, a piece of fruit, and a glass of milk. Avocados, bananas, beef, brown rice, cheese, chicken, tuna, turkey are a few of the brain builders, whereas alcohol, artificial food colouring, artificial sweeteners, colas, corn syrup, frostings, high-sugar 'drinks', hydrogenated fats, junk sugars, nicotine and white bread are considered to be brain drainers (Sears, W. 2000) Consumption of caffeinated drinks keeps a student agitated in the classroom, if taken in an empty stomach. The acidity of the drink (carbon dioxide dissolved to make it fizzy) destroys the epithelium of the stomach, while the stimulant induces hyperactivity causing behaviour problems in classrooms. It is not an uncommon sight on school premises, students walking around with snack foods and caffeinated soft drinks before the classes begin in the morning.

A caring parent will make sure that the child has a good breakfast with plenty of protein for physical growth and resistance against diseases and sufficient brain foods containing the right kind of fat and carbohydrates for brain efficiency and energy. The parent should ensure that the youngster drinks plenty of water and fruit juices for minerals and vitamins.

Forming Good Habits

A parent can contribute a lot in this area. Repetition of certain functions such as getting up early, personal care, timely meal, good manners, proper hygiene, regular exercise and use of acceptable language should be insisted, when the children are very young. Such repeated practices get established as conditioned reflexes in the brain and develop into good habits. Parents should ensure that their children attend school regularly so that they do not lose continuity of the concepts taught. It is imperative that their children attend school with the required paraphernalia for participation and completion of work in class. Parents should create opportunities to involve themselves with their children's education. This will give them the security that their parents care about them and their future.

Developing Positive Attitudes

Children are impressionable and choose to imitate the adults around them from an early age. The parents are their first and the best models to copy. Hence, the parents have to be conscious of their words and actions, when a child is around. A toddler may not repeat the words, when the parent gives vent to his/her frustration, but the words get implanted in the brain and will come out one day when he/she is able to lisp a few words, - to the utter shock of the parent. Discussions at the dining table should be free from maligning teachers, schools, races and others. Such practices affect a child's attitude towards the mentioned and are detrimental to the learning environment, where the student is an active participant in the learning process.

The parents need to feel that they are a part of the school and be supportive of all the efforts taken for the benefit of their children. A school is essentially a group of people with feelings; constructive criticism will ensure high performance and harsh judgements will affect the school's and the teachers' performance adversely, thus affecting the achievement levels of their children.

Liaison with Parents and Community

Parents and the local community should become an integral part of the school and get acquainted with the school's policy, teachers, administrators and support staff and involve themselves in the daily routine. The schools should welcome such a liaison and offer them opportunities to share responsibilities and make them feel wanted. The parents should be encouraged to share their time, ideas, knowledge and expertise. Involving the grand parents in school activities might develop a gentle and caring attitude in children.

A few areas where the parents could contribute would be, assisting in the library, helping the students in reading and writing, supervision in the absence of a teacher, assisting in home work completion and remedial work for the low achievers and supervising the viewing of educational programmes on television after school hours. The parents could participate in fund raising projects (to improve facilities at school and offer scholarships to worthy students), help in vocational training, maintaining the school garden and buildings and so on. In return, the school could offer learning opportunities for the parents and the others in the local community. The adults who are in need of basic education would welcome adult education, literacy and numeracy projects. Evening classes can be conducted after school hours in selected fields and the parents and the community will benefit as a result.

Computer literacy is another area, where the school could help the interested people in the locality. Word processing and the Internet based courses could be developed and tailored to the needs of the parents, current and past students and local community. They may be permitted to use the computer facilities after school hours, managed by a few responsible volunteers in the community.

Here are a few facilities the community might enjoy:

Email	For sending personal messages
Web Browsers	For accessing the course web site, For accessing Internet resources
Web sites	To provide course resources (text, graphics, maybe audio, video) To create quizzes, to collect assessment, To create self-tests, To provide bulletin board, To facilitate surveys, tracking and other feedback
Word processor	Constructing assignments, Constructing course resources, others

Conclusion

Let me conclude in the words of Shirley McCune, Former Senior Director of Mid-Continent Regional Educational Laboratory, who conducted valuable educational research for the U.S. Department of Education.

> "...major task of educational programs is to extend the world view of the child; this should include a view of careers, of the community, of our nation and our global community.
>
> ...If an organization is to renew itself, it must become serious about supporting and empowering employee and governance development. The organization itself must become a learning and knowledge creation organization. In essence, the organization must play a critical role in individual empowerment and change".

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References:

Andersen Schools of Many Voices Multicultural Laboratory Demonstration Site, (n.d.) Retrieved August 29, 2002, from http://www.mpls.k12.mn.us/MCGFDA/Block.html

ASCII 2002, America Goes Back to School. *Family-School Compact for Learning* Retrieved August 29, 2002, from www.ed.gov/Family/BTS/pt12.html

CAREI *Authentic Assessment.* (n.d) Retrieved May 14, 2001, from http://carei.coled.umn.edu/Programs/standards/pedagogy/assessment/appendixD.htm

Barcan, A. 2000, *Attempts to Reform Australian schools* Retrieved August 10, 2000, from http://www.ecel.uwa.edu.au/gse/erp/vol23no1/clements.html

Bybee, R (n.d.) *Constructivism and the Five E's and Seven E's* BSCS. Retrieved May 19, 2000, from http://www.miamisci.org/ph/1pintro5e.html

Conner, M. (n.d.) *HUMAN ATTENTION SPAN* Retrieved August 24, 2002, from http://www.learnativity.com/attention.html

Cook Counseling Center on-line (n.d.) *Study skills* Retrieved May 28, 2002, from http://www.ucc.vt.edu/

Dickinson, D. (n.d.) *CREATING THE FUTURE* Retrieved August 29, 2002, from http://www.newhorizons.org/nhfl/notices/current.htm

Duluth, U.M *Student listening skills* 2001, Retrieved August 24, 2002, from http://www.d.umn.edu/student/loon/acad/strat/ss_listening.html

Early Development and Education (n.d.) Retrieved September 8, 2002, from http://www.teachmorlovemore.org/BestTrendsDetails.asp?faqid=186

Edarticles. (n.d.) *Authentic Assessment – a briefing*. Retrieved May 14, 2001, from http://home.ecn.ab.ca/~ljp/edarticles/assessment.htm

Envisage Design *Building Baby's Intelligence: Why Infant Stimulation is Important* (n.d.) Retrieved September 8, 2002, from http://www.envisagedesign.com/ohbaby/smart.html

ERIC Digest (n.d.) *The Case for Authentic Assessment.* Retrieved May 16, 2001 from http://www.ed.gov/databases/ERIC_Digests/ed328611.html

Fernando, C. (n.d.) *Implementing Innovative Visual Aids in Engineering Education* Retrieved August 24, 2002, from http://spacegrant.nmsu.edu/conference/2002/papers/Cadena2.htm

Grotzer 2001, *Understanding counts!: Teaching for Depth in math and Science*. Retrieved September 8, 2002, from http://www.pz.harvard.edu/Research/Funnel/Bk1dpund.fin.pdf

Hr. Zone. 2001, *Hard Evidence for Soft Skills* Retrieved August 16, 2002, from www.hrzone.com/articles/teams_soft_skills.html

Inspiration Software 2000, Trial 6 *Tool for Concept Mapping*. Retrieved April 10, 2000, from http://www.inspiration.com

Inspiration Software 2002, *The power of visual learning* Retrieved September 3, 2002, from http://www.inspiration.com/vlearning/index.cfm

Kirkwood, M. 2002, *Infusing Thinking in the Curriculum* Retrieved September 8, 2002, from http://www.scre.ac.uk/rie/nl69/nl69kirkwood.html

Manktelow, J. *Mind Tools - Improving Note taking with Concept Maps.* (n.d.) Retrieved April 10, 2000, from http://www.mindtools.com/mindmaps.html

Mathias, R. & Swan, N. 2002, *Listening Skills* Retrieved August 28, 2002, from http://www.drugabuse.gov/NIDA_Notes/NNVol10N6/ARCNeuro.html

McCune (n.d.) *RESTRUCTURING EDUCATION* Retrieved August 28 2002, from http://www.newhorizons.org/nhfl/notices/current.htm

Mind mapping FAQ .Retrieved April 10, 2000, from http://world.std.com/-emagic/mindmap.html

Nunley, K. F. *Active research leads to active Classrooms* (n.d.) Retrieved April 10, 2000, http://help4teachers.com/activeresearch.htm

Nunley, K. F 2000, *Layered Curriculum* (n.d.) Retrieved August 28, 2002, from http://www.roxbury.net/psch02listen.html

Nunley, K. F 2000, *Listening Skills* 2002, Retrieved August 28, 2002, from http://Help4Teachers.com

Sacarin, I. 2002 *Listening learning Programs as Developed by Dr. Alfred Tomatis* Retrieved September 3, 2002, from http://www.sacarin.com/

Schmier, L. (2000) *Teaching Tips.* Retrieved September 6, 2000, from http://www.teachingtips.com/

Sears, W. 2002, *Feed your brain the right fats.* Retrieved August 16, 2002, from http://www.DHAdoc.com/

Sprague & Dede (n.d.) *Constructivism in the classroom.* Retrieved May 19, 2000, from http://www.ist.org/L&L/archive/v0/27/no1/feature/

The Scottish Council for Research in Education 2002,*Can thinking skills be taught?* Retrieved September 3, 2002, from http://www. Scre.ac.uk/scot-

Tipper, M. *WHY REPETITION IS IMPORTANT* Retrieved May 28, 2002, from http://www.happychild.org.uk/acc/tpr/amz/1198rept.htm

Tomatis, A. 2002 *Various Educational Applications of the Listening Training Method* Retrieved September 3, 2002, from http://www.listeninglearning.com/

Publications:

Swartz, R.J., & Parks, S. (1994) *Infusing the Teaching of Critical and Creative Thinking into Elementary Instruction.* Critical Thinking Books and Software.

Treagust, D.F., Duit, R. & Fraser, B.J. (1996) *Improving teaching and learning in science and mathematics.* New York: Teachers College Press.

Treagust, D.F., Harrison & A.G., Venville, G.J. (1998) *Teaching Science Effectively With Analogies: An Approach for Preservice and Inservice Teacher Education,* Journal of Science Teacher Education, 9(2), 85 – 101 Kluwer Academic Publishers, Printed in Netherlands.

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